

y.  $L = 91 \text{ cm}$   $A = 8.5$   $x(t) = -4$   
 $t = ?$

$$T_P = 2\pi \sqrt{\frac{L}{g}} = 1.915$$

$$f = 0.522 \text{ Hz}$$

$$x(t) = A \cos(2\pi f t)$$

$$\frac{-4}{8.5} = \frac{8.5}{8.5} \cos(2\pi(0.522)t)$$

$$-0.471 = \cos(2\pi(0.52)t)$$

$$\cos^{-1}(-0.471) = 2\pi(0.52)t$$

$$t = 0.6275$$

Dec 3-7:30 AM

f. M

$$k = 550 \text{ N/m}$$

$$x = 4 \text{ cm}$$

$$F_g = F_s$$

$$M \cdot 9.8 = -(550 \text{ N/m})(-0.04 \text{ m})$$

$$M = 2.24 \text{ kg}$$

Dec 3-7:36 AM

W.  $A = 10 \text{ cm}$   $t = .3$   $x(.5) = -5 \text{ cm}$

$$\frac{-5 \text{ cm}}{10} = \frac{10}{10} \cos(2\pi f(.5))$$

$$-\frac{1}{2} = \cos(\pi f)$$

$$\cos^{-1}\left(-\frac{1}{2}\right) = \pi f$$

$$2.094 = \pi f$$

$$f = 0.67$$

Dec 3-7:38 AM

P.  $0.5 \text{ kg}$   $x = 15 \text{ cm}$   $A = 16 \text{ cm}$

$$F_g = F_s$$

$$(0.5)(9.8) = -k(-.15)$$

$$k = 32.67 \text{ N/m}$$

$$T_P = 2\pi \sqrt{\frac{0.5}{32.67}}$$

$$= 0.777$$

Dec 3-7:40 AM

Pendulum on E<sub>1</sub> $T_P, L$ 

Another planet,

 $T_P$  30% longerFind  $g$  new planet

$$T_{PE} = 2\pi \sqrt{\frac{L}{g}}$$

$$T_{PE} = 1.3 T_{PE}$$

$$1.3 T_{PE} = 2\pi \sqrt{\frac{L}{g}}$$

$$(1.3)(2\pi) \sqrt{\frac{L}{g}} = 2\pi \sqrt{\frac{L}{g}}$$

$$1.3 \sqrt{\frac{L}{g}} = \sqrt{\frac{L}{g}}$$

$$1.69 \left(\frac{L}{g}\right) = \frac{L}{g}$$

$$1.3 = \sqrt{\frac{L}{g}}$$

$$\frac{1.69}{9.8} = \frac{1}{g} (1.3)^2$$

$$g = 5.87 \text{ m/s}^2$$

Dec 3-7:48 AM

L

L increased by 17cm,

$$T_P \uparrow 10\%$$

Find L

$$T_P = 2\pi \sqrt{\frac{L}{g}}$$

$$\text{new } L_2 = L + .17$$

$$1.1 T_P = 2\pi \sqrt{\frac{L + .17}{g}}$$

$$(1.1)(2\pi) \sqrt{\frac{L}{g}} = (2\pi) \sqrt{\frac{L + .17}{g}}$$

$$1.21 \left(\frac{L}{g}\right) = \left(\frac{L + .17}{g}\right)$$

$$1.21L = L + .17$$

$$0.21L = .17$$

$$L = 0.81 \text{ m}$$

Dec 3-7:57 AM

Spring,  
m, T<sub>p</sub>

2m, 76% T<sub>p</sub>

Find k

$$T_s = 2\pi \sqrt{\frac{m}{k}}$$

$$1.6 T_s = 2\pi \sqrt{\frac{2m}{k}}$$

$$(1.6)(2\pi) \sqrt{\frac{m}{k}} = 2\pi \sqrt{\frac{2m}{k}}$$

Find m

$$(2.56) \left( \frac{m}{k} \right) = \frac{m + 5}{k}$$

$$2.56m = m + 5$$

$$1.56m = 5$$

$$m = 3.21 \text{ kg}$$

Dec 3-8:02 AM

Spring,  
m, k, T<sub>s</sub>

New Spring  
k is doubled, m  
what % does the T<sub>s</sub> change?

$$x T_s = 2\pi \sqrt{\frac{m}{k}} \quad T_s = 2\pi \sqrt{\frac{m}{k}}$$

$$x(2\pi) \left( \sqrt{\frac{m}{k}} \right) = 2\pi \sqrt{\frac{m}{2k}}$$

$$x^2 \left( \frac{m}{k} \right) = \frac{m}{2k}$$

$$\sqrt{x^2} = \sqrt{\frac{1}{2}}$$

$$x = \frac{1}{\sqrt{2}}$$

$$x = 0.707$$

$$\frac{1.6000}{3.21} = 0.5000$$

29.02% ↓  
80% ↓

Dec 3-8:07 AM